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ABSTRACT

A human capital study was conducted at Montgomery College to assess the rate of return on educational expenditures by contrasting the future lifetime earnings of people with less education with that of people with greater educational attainment. The study assessed the costs of education (e.g., for tuition and fees, books and supplies, foregone earnings, and transportation) and the benefits of attending community college in terms of earning differentials. Two groups of students were examined: all students who enrolled at Montgomery College for the first time in fall 1980 and all students who graduated from the college during fiscal year 1980. Rates of return were calculated for both groups based on attendance and employment patterns. Study findings included the following: (1) the cost of education for a male attending school full-time and working part-time included an average of $3,640 in foregone earnings, $859 in tuition and fees, $286 in books and supplies, and $1,020 in transportation; (2) the average student could expect a 25% rate of return on his/her investment in education; (3) the average rate of return for graduates was 33.8%, with a high of 64.8% for males who were attending college part-time and working full-time and a low of 12.7% for females who were unemployed and attending college part-time; (3) the average return to society for the investment in education was 18% for currently enrolled students and 25% for college graduates. (HB)

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RATES OF RETURN ON INVESTMENTS IN EDUCATION AT MONTGOMERY COLLEGE: October, 1983

A Human Capital Study Of All First-Time Students Enrolled During Fall 1980 and FY 1980 Graduates

Montgomery College
Office of Institutional Research
Montgomery County, Maryland
October 1983

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EXECUTIVE SUMMARY

Education is one way that people invest in themselves. By paying some costs now, they can earn greater returns in the future. The study of this type of investment is called human capital. As the term implies, people have certain abilities and skills to use in earning money. Higher education can influence those attributes in many ways, from increasing skill levels to influencing behavior.

The method of measuring human capital used in this study, called "rate of return," contrasts the future lifetime earnings of people with less education with people that have greater educational attainment. In this method, all the costs are subtracted from all the benefits.

Costs include direct expenditures, such as salaries, student tuition and fees, transportation, books and supplies, and indirect costs of foregone student earnings. Benefits are primarily the increased productivity that comes as a result of education. The main measure of this productivity is the higher earnings students receive because they attended college. The formulas used in the rate of return method take into account the long investment period by discounting future earnings. This method results in an "internal rate of return," which can be compared with other investments that have a guaranteed rate of return.

This study focused on two different groups of students at Montgomery College. The first group included all students enrolled for the first time in the fall of 1980. The second group included all students who graduated from Montgomery College during FY 1980. Rates of return for both groups of students were calculated based on attendance pattern (full-time or part-time attendance) and employment during college (full-time or part-time, or unemployed).

Most of the data elements in the formulas came from estimates based on actual data. The results, however, are only estimates that can be affected by economic changes and employment fluctuations. At the same time the results can give an individual or society an idea of the economic value of an investment in community college education. The study also does not measure the effect of college on the richness of a person's life or his/her increased contribution to the social fabric of the community.

RESULTS

The results illustrate not only economic returns for individual graduates and non-graduates, but also the return for society at large. When looking at "private" human capital investments, only factors affecting the individual are considered. The "social" human capital model takes into account costs and benefits to society as an economic entity.

Private Investment

The average student at Montgomery College could expect about a 25 percent internal rate of return on his or her investment in education. This means that students on the average can expect to realize a return of 25 percent of their total investment in their Montgomery College education per year for the rest of their working careers. The average figure was weighted using actual employment and enrollment data compiled by the College's Office of Institutional Research.

The internal rate of return for investment in education at Montgomery College for the average student ranged from a high of 100 percent for male students who were both working and attending college full-time to 8.7 percent for male students who were unemployed and attending college part-time. Returns for women ranged from 9.0 percent for unemployed, part-time students to 34.5 percent for full-time employed, part-time students.

The private internal rate of return for graduates of Montgomery College ranged from a high of 64.8 percent for full-time employed males attending college full-time to 12.7 percent for unemployed females attending college part-time. The average graduate could expect a return of 33.8 percent.

Social Investment

The internal rate of return to society for the investment in education at Montgomery College for all students ranged from a high of 48 percent for full-time employed males attending college full-time to a low of eight percent for unemployed females enrolled part-time. Society could expect a return for the average student at Montgomery College of about 18 percent.

The social return on an investment in the average Montgomery College graduate was about 25 percent. By subgroup, the social returns ranged from a high of 40.6 percent for full-time employed males who attended college full-time to a low of 11.5 percent for unemployed females attending college part-time.

DISCUSSION

Keeping all the limitations of this study in mind, the results still indicated a solid return both to individuals and to society for their investment in community college education. The results also showed that returns for graduates were usually greater than those for students who did not graduate.

The estimates in the study fall short of a complete determination of all the social and private benefits that come from investing in community college education. The computed returns imply, however, that for now investment in education at Montgomery College is sound economic policy.

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INTRODUCTION

Education is one way that people invest in themselves. By paying some costs now, they can earn greater returns in the future. The study of this type of investment is called human capital. As the term implies, people have certain abilities and skills to use in earning money. Higher education can influence those attributes in many ways, from increasing skill levels to influencing behavior.

There has been much controversy about the causal linking of education and earnings. Many question if education is a sufficient condition for getting higher paying jobs. However, for most people education does appear to be a necessary catalyst for increasing earning power.

If higher education is to be considered an investment, there should be some way the investors, both students and taxpayers, can gauge its effectiveness. This is what human capital studies try to do. By measuring only economic benefits, they do not take into account all the benefits to society or the individual, but neither do they measure all the costs.

Methodology

The method of measuring human capital used in this study, called "rate of return," contrasts the future lifetime earnings of people with less education with people that have greater educational attainment. The actual calculation of the value of human capital using the rate of return method is very straightforward. All the costs are subtracted from all the benefits. Complexities arise in determining which costs and benefits to include and how to estimate them, and how to allow for an investment return that occurs over a lifetime.

Costs of education can be divided into the direct expenditures, such as student tuition and fees, and the indirect costs of foregone student earnings. Benefits are primarily the increased productivity that comes as a result of education. The main measure of this productivity is the higher earnings students receive because they attended college. The

formulas used in the rate of return method take into account the long investment period by discounting future earnings. This method results in an "internal rate of return," which can be compared with other investments that have a guaranteed rate of return. An investor in real estate, stocks, or other long-term investments would use a similar formula to estimate his or her return on expected future earnings.

Population

This study focused on two different groups of students at Montgomery College. The first group included all students enrolled for the first time in the fall of 1980. The second group included all students who graduated from Montgomery College during FY 1980. Rates of return for both groups of students were calculated based on attendance pattern (full-time or part-time attendance) and employment (full-time or part-time or unemployed) during college.

Limitations

The major limitation in this type of study is in estimating future earnings from which the income differentials are determined. The Census is most often used because it provides the most comprehensive data base. The main drawback to using Census data is that it reports income rather than earnings. However, studies have shown that Census data tends to under-report all types of income, especially for property as opposed to wages and salaries.

Unfortunately 1980 Census data for Montgomery County were not available for analysis at the time of the study. However, a recent (1977) study by the Maryland-National Capital Park and Planning Commission was able to provide income data by sex, education (high school and 1-2 years of college) age, and single head of household. Because the sample size was adequate and the study design was reliable, the data from Park and Planning were adapted for this study's needs.

Most of the data elements in the formulas were based only on estimates. It would be impractical to track thousands of students for a 40-year period to calculate an exact rate of return. However, the estimates were based on as much actual data as possible. The method also has been

greatly refined as the results of long-term cohort studies have been completed. It cannot be emphasized too strongly that the results of this and similar studies are only estimates that can be affected by economic changes and employment fluctuations. These results can, however, give an individual or society an idea of the economic value of an investment in community college education.

The returns calculated in this study are based on average experiences of past students. Use of the results to justify expansion of community college education assumes that additional students will realize rates of return comparable to those of past students. It is possible that the rate of return for a greater number of students may fall below those found in this study.

This study also does not attempt to measure the economic impact of the growing non-credit programs. This is due primarily to lack of income data for students enrolled in these programs.

Finally, the estimates in this study do not determine all the social and private benefits that come from investing in community college education. The study does not measure the effect of college on the richness of a person's life or his/her increased contribution to the social fabric of the community.

COMPUTATIONS AND RESULTS

The results will illustrate not only economic returns for graduates and non-graduates, but also the returns for individuals and society at large. When looking at "private" human capital investments, only factors affecting the individual are considered. On the cost side are primarily tuition and fees, books and supplies, transportation and foregone earnings. On the benefit side are financial aid and the value of earning differentials. This is the same information that a student probably uses in making a decision about whether or not to go to college, where to go, and the value of the additional education. Non-economic factors, such as foregone leisure time or increased cultural awareness, are not considered, in the economic model.

The "social" human capital model takes into account costs and benefits to society as an economic entity. The individual costs are added to the public costs of subsidies to higher education. For Montgomery College, the largest portions are contributions from the State and County governments. The final results reflect the value of the increased productivity that society can expect as a result of its investment in community college education.

Private Investment

The private human capital investment models compare only those costs and benefits which accrue to the individual. Most studies in the past have found that individuals do very well from an economic point of view from their investments in higher education. As noted earlier, the equations for computing the rate of return must include the costs of community college education, the difference between the earnings of the college educated compared to those without a college education, and the present value of those future earnings.[1] The research that refined the study of human capital was spearheaded by researchers such as Theodore W. Schultz,[2] W. Lee Hansen and Burton A. Weisbrod,[3] and Gary S. Becker.[4]

The equations themselves are fairly straightforward, with costs occuring in the initial years and benefits accruing thereafter. Private investments equations for all students and graduates that were enrolled part-time and full-time are illustrated below:

Private Investment Equations:

Part-Time Students (All):

$$\frac{-TF-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-TF-BS-e(FG)-T+FA}{(1+i)^2} + \frac{(1-a)(e)(ED)}{(1+i)^3} + \ldots + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

Full-Time Students (All):

$$\frac{-TF-BS-e(FG)-T+FA}{(1+i)^1} + \frac{(1-a)\,(e)\,(ED)}{(1+i)^2} + \ldots + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

Part-Time Students (Graduates)

$$\frac{-TF-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-TF-BS-e(FG)+FA}{(1+i)^2} + \frac{-TF-BS-e(FG)-T+FA}{(1+i)^3} +$$

$$\frac{-TF-BS-e(FG)-T+FA}{(1+i)^4} + \frac{(1-a)(e)(ED)}{(1+i)^5} + \ldots + \frac{(1-a)\,(e)(ED)}{(1+i)^n} = 0$$

Full-Time Students (Graduates):

$$\frac{-TF-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-TF-BS-e(FG)-T+FA}{(1+i)^2} + \frac{(1-a)(e)(ED)}{(1+i)^3} +$$

$$\ldots + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

TF = Tuition and fees (See Tables 1 & 2)

BS = Books and supplies (See Tables 1 & 2)

e = Labor force participation rate (Maryland Department of State Planning)

Male = .82

Female = .60

FG = Foregone earnings (See Tables 1 & 2)

T = Transportation (See Tables 1 & 2)

FA = Financial aid (See Tables 1 & 2)

a = Ability adjustment factor (.20)

ED = Earning differential between high school graduate and person with 1-2 years of college (The Maryland-National Capital Park and Planning Commission)

i = Interest or return rate (Computed)

Most human capital studies in higher education have been concerned only with the full-time enrolled student. Because of the nature of community colleges and the recent trend toward increasing numbers of part-time students, an important segment of the community college population would be eliminated. Only 34 percent of the student body at Montgomery College during fall 1980, for example, were enrolled as full-time students. One way to allow for this is to use full-time equivalent figures, but this ignores important differences in full and part-time students, especially when foregone earnings are added to the costs. For this reason, this study treated the part-time population differently from the full-time population using separate equations.

In the following section, each element of the equation will be discussed, including an explanation of how the data were calculated and the actual figures used for the Montgomery College study. Information about the College, both for graduates and non-graduates was supplied by the College's Office of Institutional Research. Information from other sources will also be noted. The results will reflect the average student who was enrolled in fall 1980 or who graduated during FY 1980.

1. Costs of Attending Community College

The first cost that comes to mind when a person is trying to decide whether or not to go to college is the amount of tuition and fees charged by different kinds of colleges. However, there are many other costs, such as transportation and foregone earnings which may be even more critical.

Other factors often associated with college costs were not included in this study because of the difference between community colleges and traditional four-year institutions. For example, costs for room and board were not included primarily because such a large segment of the population attended college part-time. In addition, Montgomery College does not provide any on-campus housing. Room and board costs in any event would still be incurred, even if the individual did not attend college. There is no reason to believe that room and board costs of students were any higher than for anyone else, and therefore, these costs were not really related to the college investment.

Another cost not included in this study that some researchers feel is important was the value of foregone leisure time. This is particularly applicable to part-time students who may also be working. However, it is difficult to place an economic value on this element. In addition, economic values were also not placed on the non-economic benefits of education that are not measured by increased earning power.

a. Tuition and Fees

In the equations, the amount paid by individuals for tuition and fees was based on actual fee schedules for the years under consideration (FY77-80 for graduates and FY80-81 for all students). In order to determine the amount the average student paid in one year, it was necessary to estimate the number of credit hours he or she took either full-time or part-time. Data from the Montgomery College Student Follow-Up Study of First-Time Students (Fall 1978), indicated that the average male completed about 26 credits and the average female 23 credits. It was estimated to take part-time students two years and full-time students one year to complete these credit hours. These estimates were multiplied in turn by the actual costs students paid per credit hour for 1980 and 1981.

Table 1 shows the private costs paid by all Montgomery College students.

TABLE 1
Private Cost Factors - All Students

Student Status	Age	Yrs. In College	Forgone Earnings: Employed Full-Time	Forgone Earnings: Employed Part-Time	Forgone Earnings: Unemployed	Financial Aid	Tuition & Fees	Books & Supplies	Transportation
Male									
Full-time	20	1	0	$3,640	$7,500	$132	$859	$286	$1,020
Part-time	25	2							
Yr 1			0	$3,640	$7,500	$132	$427	$143	$ 510
Yr 2			0	$3,713	$7,650	$132	$452	$143	$ 510
Female									
Full-time	19	1	0	$3,640	$7,500	$132	$768	$257	$1,020
Part-time	29	2							
Yr 1			0	$3,640	$8,167	$132	$362	$128	$ 510
Yr 2			0	$3,713	$8,330	$132	$417	$129	$ 510

Sources: Montgomery College Student Follow-Up Study: First-Time Students Fall 1978, The Montgomery College Student, Montgomery College The Maryland Capital Park & Planning Commission.

Similar computations were made for Montgomery College graduates. The determination of the number of credit hours taken by the average graduate came from the Graduate Follow-Up Study (1980). The average number of hours completed by graduates in 1980 was 63. It was estimated that full-time students took two years and part-time students four years to complete these credit hours. The number of credit hours were multiplied by actual costs students paid per credit hour in 1977, 1978, 1979 and 1980. Table 2 shows the estimated tuition and fees paid by 1980 Montgomery College graduates.

TABLE 2
Private Cost Factors - Graduates

Student Status	Age	Yrs. In College	Foregone Earnings: Employed Full-Time	Foregone Earnings: Employed Part-Time	Foregone Earnings: Un-employed	Financial Aid	Tuition & Fees	Books & Supplies	Trans-portation
Full-time	21	2							
Yr 1			0	$3,640	$7,500	$132	$1,019	$330	$1,020
Yr 2			0	$3,713	$7,650	$132	$1,113	$330	$1,020
Part-time	19	4							
Yr 1			0	$3,640	$7,500	$132	$ 440	$165	$ 510
Yr 2			0	$3,713	$7,650	$132	$ 497	$165	$ 510
Yr 3			0	$3,787	$7,802	$132	$ 526	$165	$ 510
Yr 4			0	$3,863	$7,959	$132	$ 556	$165	$ 510

Sources: Montgomery College Student Follow-Up Study: First-Time Students Fall 1978, The Montgomery College Student, Montgomery College
The Maryland Capital Park & Planning Commission.

b. Books and Supplies

The College estimated the average cost of books and supplies for each three-credit course was $33. This amount was multiplied by the estimated number of courses taken by full-time and part-time students based on credit hours taken. Tables 1 and 2 show the results for all 1980 students and 1980 graduates.

c. Transportation

Transportation costs were based on College estimates from the Financial Aid Office. The College estimated that full-time students using private transportation would have spent about $1,200 a year for car costs. Students using public transportation would need only 40 percent of this amount. Because the College did not know the breakdown of private vs. public transportation use, an arbitrary figure of 75 percent usage of private transportation was selected. Based on these estimates and assumptions, it was determined that the average full-time student would spend $1,020 per year for transportation, and the average part-time student $510.

While these transportation estimates may seem capricious, it was necessary to make an effort to estimate the costs to students to attend a commuter college. As illustrated in Tables 1 and 2, transportation costs did in some instances exceed students costs for tuition and fees.

d. Foregone Earnings

A primary cost for many students is the opportunity cost of foregone earnings. This is the income that a student could have earned if he or she worked full-time rather than attend college. Foregone earnings are often a neglected cost of investment in human capital, but they should be treated as indirect outlays. In studies of community college human capital, foregone earnings are probably not as critical as in studies of traditional four-year institutions because of the large number of community college students who are employed either full-time or part-time. This factor was taken into account when the results were tabulated.

In order to estimate foregone earnings, it is necessary to know average earnings of comparable high school graduates, and the students' age and sex. Income data for high school graduates by age group were obtained for Montgomery County from a 1977 study by The Maryland-National Capital Park and Planning Commission. Using data compiled from student records and the 1980 Graduate Follow-Up, the age at College entry of male and female students enrolled full and part-time was determined. (See Tables 1 and 2.) Matching age and sex to earnings data from Park and Planning resulted in the foregone earnings figures shown in Tables 1 and 2. The differences between earnings by year were made by applying a growth factor to the 1977 data based on the increase of actual earnings in Montgomery County for these years. Those working part-time were estimated to have foregone about half of the full-time earnings. Full-time employed students had no foregone earnings.

As shown in the equations, the foregone earnings are also multiplied by a labor force participation rate. If a person attends college because he cannot find a job, for example, then he is not foregoing any earnings. To adjust for this factor, foregone earnings were multiplied by the labor force participation rates for Montgomery County supplied by the Maryland State Planning Department.[6] Differences between male and females were taken into account when the results were calculated. The employment rate for men was 82 percent, and for women, 60 percent. That means 18 percent of Montgomery County males and 40 percent of the females who were unemployed would not have foregone any earnings by attending college.

2. Benefits of Attending A Community College

On the plus side of the equation is the increased productivity that comes as a result of education. The main measure of this productivity is the higher wages students earn because they attended college. This study measured the difference in earnings between high school graduates and those with some college education. Students also can receive benefits in the form of financial aid or scholarships while they are in school.

a. Financial Aid

One benefit to individuals that accrues while they are in college is in the form of financial aid. If the student were not in college, the aid would not be "earned." Therefore, average aid payments which are used to offset tuition and other expenses to community college students can be included in the equations.

The total amount of financial aid was computed by the College Financial Aid Office and included grant and work awards. Loan monies were excluded from the computations. Because the percentage of women enrolled in fall 1980 and the percentage of women receiving grants was identical, the average award should have been similar for all men and women enrolled at the College. The average award per unduplicated person enrolled during the fiscal year was estimated to be $132. The same figure was used for graduates as well (Tables 1 and 2).

b. Earning Differentials

The major economic benefit of higher education to the individual comes in the form of higher earnings. Whether or not the difference in earnings reflects actual increases in productivity is immaterial to the person making the investment from an economic viewpoint. The difference in lifetime earnings between a high school graduate and a person with one to two years of college was used to measure the increased earnings of all students attending community college. Actual earnings reported by respondents in the Graduate Follow-Up were compared to high school graduate earnings to determine differentials for graduates.

As noted earlier, Census data are most often used in human capital studies primarily because it provides the most recent and comprehensive data base available. Because Census data by age, sex and education for Montgomery County residents were not yet available, data from a recent (1977) study by the Maryland-National Capital Park and Planning Commission were used. The total sample size for single heads of households who had completed high school or who had 1-2 years of college was 9,491 (5,411 high school graduates and 4,080 who had completed 1-2 years of college).

There are several drawbacks to using this income data. First of all, the data report income rather than earnings. This could result in an overstatement of returns if income differentials between educational categories are much larger than the corresponding earnings differentials. However, studies of this type usually result in an under-reporting of all types of income with the bias being greater for property income as opposed to wages and salaries. At the aggregate level, the unadjusted data probably did not greatly overestimate earning differentials between the different levels.

Because the Park and Planning Study reported the household income, it was necessary to use data only from single heads of households to eliminate households reporting more than one income. Because there is no way to determine if single heads of households are more likely to earn more or less than individuals coming from households with more than one wage-earner, no effort was made to adjust the data for this factor.

The use of the category of one to two years of college in the results for all students also has drawbacks. The Park & Planning data as well as Census data did not discriminate between community college vs. four-year college education. Because community college students often learn very specific skills that translate into increased earnings potential, the Park & Planning data very likely understate income of community college students as opposed to students with one to two years of a liberal arts college background.

Even with these drawbacks, the Park & Planning data were used in the Montgomery College study. First of all, it did provide actual income data for Montgomery County residents. The income data also followed trends reported in a study of high school and four-year college graduates done by the National Center for Education Statistics (NCES).[7] Inititally the NCES college group, similarly to the group with one to two years of college in the Park & Planning study, earned less than their counterparts who had only a high school education. The college group quickly passed the high school group, with the catching-up point occurring earlier for women than men.

To determine differentials for Montgomery College graduates the average earnings reported by respondents in the 1980 Graduate Follow-Up were compared to high school graduates' earnings from the Park & Planning study. A modest growth factor based on recent earning increases found in Montgomery County was applied to the community college graduate earning data to calculate estimated lifetime earnings. As to be expected, the earnings reported by graduates were higher than those reported by individuals with less than two years of college.

Several studies have indicated that income differentials for people over 60 years of age had no discernible impact on the rates of return.[8] This was due to both employee retirement and the use of equations that compute present values of future returns. For this reason, the income

streams for this study were arbitrarily truncated at age 64. Returns were also not adjusted for mortality because previous studies found it to have virtually no impact on the rates of return.[9]

The long pay-off periods have a definite effect on the rate of return on a college education. Life cycle characteristics are important, particularly in measuring returns on community college education. The income data shows that individuals in their 30's and 40's make more money than 20-year-olds just entering the labor force. This is due not only to experience but also to salary increases pegged to length of time worked.

The average part-time male student who entered Montgomery College at 25 or female who entered at age 29 probably earned more money upon leaving the College than the average full-time student who was about 19 or 20 (Table 1). This is because the older student was compensated for the experience gained before entering college. The older students, then, received higher returns earlier in the benefit stream than the younger students. This is important when using present value equations because those higher returns were less affected by the discount rate. Earning $2,000 more a year now is more significant than making $2,000 more ten years from now. Even though the older students have a shorter benefit stream, the present value of their earning differentials may actually be higher than younger students who work longer.

Because of recent economic trends in actual earning increases, this study did not employ a growth rate to capture anticipated inflationary or productivity increases. Past studies have shown that the use of income averages by age based on cross-section surveys such as the Census and survey data in the Park & Planning study produce lower values than would be obtained by using averages based on each successive Census. The results of this study are very likely understated because no allowance for growth rates was made. However, the understatement was deemed more acceptable than using an arbitrary growth factor based on uncertain economic forecasts.

Earning differentials in all equations, however, were adjusted for ability. Variables other than educational attainment can affect the differentials in average earnings.[10] The income differences between educational categories, for example are likely to overstate the effect which

education has on income since those with more income are likely to have greater ability, although there is some question if the conventional tests of ability reliably measure the talents required to succeed in the economic world.

Most researchers agree, however, that ability does determine some degree of a person's success. Those with higher ability are not only likely to earn more than their peers, but also are more likely to pursue higher education. To account for ability differences, the earning differentials were reduced by 20 percent. (Researchers have used adjustment from 0 to 33 percent in similar studies).[11]

Not everyone who attended Montgomery College will be employed. To allow for those students who did not enter the work force for any reason, the differentials were also corrected by a labor force participation rate. The rates used in this study were provided by the Maryland Department of State Planning for Montgomery County. There also was no attempt to distinguish those students who transferred to a senior institution, thereby earning more or less than those who entered the workforce directly. The income data indicate that they might make more by further investing in themselves, but this study was only attempting to measure the rate of return the average student could expect from a community college education.

Despite changes in attitudes and levels of acceptance, women continue to have lower labor force participation rates than men. Current statistics show that women are still more likely than men to drop out of the labor force during part of their careers. Since there is not concrete evidence that women attending Montgomery College were significantly different from Montgomery County women in general, it was assumed that they would display the same propensity to enter or leave the work force. The use of 1980 labor force data throughout the equation probably causes an understatement on the rate of return for women. If present trends continue, the labor force participation rate for women will probably increase in the future, resulting in greater income differentials.

In addition, the results for women in this study estimate the return the average woman can expect if she participates in the labor force an average length of time. The woman whose career is uninterrupted, however, can probably expect a higher return.

In the same NCES report cited earlier, a college education in the job market was found to offer more immediate rewards to women than to men. This was also the case in the Park and Planning income data. This factor influenced the rate of return for women, especially the older, part-time female student.

There is another reason that use of general labor force rates can cause an understated rate of return for community college students. Statistics have consistently shown over time that college-trained people are less likely to be on unemployment and welfare rolls than those with less education. Because career programs at community colleges tend to be formulated around manpower requirements of the local area, students often have little difficulty in job placement. Until there is concrete evidence that community college students were more likely to be employed than the general population, however, it is better to understate the rate of return.

Finally, although the value of education as it relates to work has been questioned, its value for employment is more apparent. The more educated person in the job market still seems to receive preferential treatment from employers. Whether or not this is justified is irrelevent if the market place responds in this mannner.

3. Results

Several factors play major roles in determining the returns of an investment in community college education. First of all, whether or not a person is employed while going to college makes a significant difference on the internal rate of return. The fact that women tend to participate less in the labor force also is an important factor. The other variable which plays an important role in the return rate is the relatively low tuition charged by Montgomery College.

Because the values for all factors differed, the population was divided into subgroups. Students were divided by sex, whether they attended college full or part-time, and whether they were unemployed or employed full or part-time while in college. The other variables in the equation were added as discussed above. The earning differentials for all students were the

differences between educational categories (high school graduate and 1-2 years of college) by age and sex found in the Park and Planning study; for graduates the differentials were the difference between Park and Planning data for high school graduates and earnings data from the 1980 Montgomery College Graduate Follow-Up Study. The number of elements in the equation, varying from 36 to 46 years, depended on the average age of a subgroup on entering college. All streams were truncated at age 64.

The internal rate of return for investment in education at Montgomery College for the average student ranged from a high of 100 percent for male students who were both working and attending college full-time (taking at least 12 hours each semester) to 8.7 percent for male students who were unemployed and attending college part-time (Table 3). Differences between men and women were due to differences in labor force participation rates which affected both foregone earnings and earning differentials as well as differences in wages earned.

TABLE 3
Human Capital Internal Rates Of Return For Private Investments
All Students

	Internal Rate Of Return
Average student	24.8%
Male	
Part-Time Student	
Employed full-time	22.1%
Employed part-time	12.6%
Unemployed	8.7%
Full-Time Student	
Employed full-time	100.1%
Employed part-time	25.3%
Unemployed	14.7%
Female	
Part-Time Student	
Employed full-time	34.5%
Employed part-time	14.5%
Unemployed	9.0%
Full-Time Student	
Employed full-time	20.2%
Employed part-time	12.7%
Unemployed	9.5%

The average student at Montgomery College could expect about a 25 percent return on his or her investment in education. This means that students on the average can expect to realize a return of 25 percent of their total investment in their Montgomery College education per year for the rest of their working careers. The average figure was weighted using actual employment and enrollment data compiled by the College's Office of Institutional Research (Table 4). The percentages in Table 4 reflect the pattern at Montgomery College of the increasing enrollment of women, part-time and working students.

TABLE 4
Student Employment Estimates By Student Status

Male		44.1%
Part-Time Students		
Employed full-time	18.6%	
Employed part-time	3.3%	
Unemployed	4.6%	
Full-Time Students		
Employed full-time	5.3%	
Employed part-time	5.4%	
Unemployed	6.9%	
Female		55.9%
Part-Time Students		
Employed full-time	24.5%	
Employed part-time	5.8%	
Unemployed	10.7%	
Full-Time Students		
Employed full-time	3.6%	
Employed part-time	5.2%	
Unemployed	6.1%	
Total	100.0%	100.0%

The internal rate of return for graduates of Montgomery College ranged from a high of 64.8 percent for full-time employed males attending College full-time to 12.7 percent for unemployed females attending College part-time (Table 5). Rates of return for subgroups were weighted by the same percentages shown in Table 4 to result in an average return of 33.8 percent for Montgomery College graduates.

TABLE 5
Human Capital Internal Rates Of Return For Private Investment Graduates

Average Student	33.8%
Male	
Part-Time Student	
Employed full-time	48.0%
Employed part-time	19.9%
Unemployed	13.2%
Full-Time Student	
Employed full-time	64.8%
Employed part-time	33.0%
Unemployed	22.7%
Female	
Part-Time Student	
Employed full-time	40.0%
Employed part-time	18.7%
Unemployed	12.7%
Full-Time Student	
Employed full-time	50.0%
Employed part-time	29.3%
Unemployed	21.0%

Social Investment

The social economic gain from education, the gain to society as opposed to individuals, differs from the private gain in costs and benefits. Social rates of return attempt to measure the cost of education to society as well as the benefits of increased productivity resulting from additional education. The costs include not only the amount the student spends for tuition, fees, books, supplies, transportation, and foregone earnings, but also the public payment of subsidies. The benefits of increased productivity are measured by increased earnings. This assumes that earnings reflect an employee's output - at this time the best indicator available.

The results in this study provide only a limited assessment of the social rate of return. They were derived by adding to private costs operating subsidies paid by the State of Maryland and Montgomery County. Costs such as depreciation on capital investments were not included. The benefits to society at large that were not captured in increased earnings also have not been incorporated into these equations. Some argue that the value to society of an educated populace is far more significant than the earnings differentials indicate.

The equations for the social investment are similar to those used in calculating private investment returns. Social investment equations for all students and graduates that were enrolled part-time and full-time are illustrated below:

Social Investment Equations:

Part-Time Students (All):

$$\frac{-SC-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-SC-BS-e(FG)-T+FA}{(1+i)^2} + \frac{(1-a)\ (e)\ (ED)}{(1+i)^3} + \ . \ . \ .$$

$$+ \frac{(1-a)\ (e)\ (ED)}{(1-i)^n} = 0$$

Full-Time Students (All):

$$\frac{-SC-BS-e(FG)-T+FA}{(1+i)^1} + \frac{(1-a)\ (e)\ (ED)}{(1+i)^2} + \ . \ . \ . \ + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

Part-Time Students (Graduates):

$$\frac{-SC-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-SC-BS-e(FG)-T+FA}{(1+i)^2} + \frac{-SC-BS-e(FG)-T+FA}{(1+i)^3} +$$

$$\frac{-SC-BS-e(FG)-T+FA}{(1+i)^4} + \frac{(1-a)(e)(ED)}{(1+i)^5} + \ldots + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

Full-Time Students (Graduates):

$$\frac{-SC-BS-e(FG)-T+FA}{(1+i)^1} + \frac{-SC-BS-e(FG)-T+FA}{(1+i)^2} + \frac{(1-a)(e)(ED)}{(1+i)^3} +$$

$$\ldots + \frac{(1-a)(e)(ED)}{(1+i)^n} = 0$$

SC = Social cost, including State and local operating expenditures and student tuition and fees (See Tables 6 and 7)

BS = Books and supplies (See Tables 6 and 7)

e = Labor force participation rate (Maryland Department of State Planning)

Male = .82
Female = .60

FG = Foregone earnings (See Tables 6 and 7)

T = Transportation (See Tables 6 and 7)

FA = Financial aid (See Tables 6 and 7)

a = Ability adjustment factor (.20)

ED = Earning differential between high school graduate and person with 1-2 years of college (The Maryland-National Capital Park and Planning Commission)

i = Interest or return rate (Computed)

For the same reasons noted earlier, this study treated the part-time population differently from the full-time population using separate equations. Much of the data used in computing the private rate of return were used in the social calculations. The discussion concerning the inclusion or exclusion of data will not be repeated in this section.

1. Community College Costs

Direct costs are obviously greater to society than to individuals because some of the expenditures are paid out of public subsidies. In this study, expenditures by the State and Montgomery County governments for appropriate fiscal years were added to student costs. Using these figures, expenditures per credit hour were calculated, and costs assigned to individual students according to their enrollment status as full-time or part-time. Federal monies were not included although some proportion probably came from Maryland tax dollars.

The social cost (SC in the equation) was determined by dividing the total amount spent by the State and the County for operating costs and by the students for tuition and fees by the number of credit hours taken to get an estimate of the cost per hour. This was done for each fiscal year covered by the equations (FY 1977-80 for graduates and FY 1980-81 for all students). The amount per credit hour was then multiplied by the number of credit hours taken by students as determined from the Montgomery College Student Follow-Up Study of First-Time Students (fall 1978) and the Montgomery College Graduate Follow-Up (1980). (See earlier discussion of tuition and fees under Private Investment.) Tables 6 and 7 show the number of credit hours taken by full-time and part-time students, the average cost per hour, and the total credit hour cost (SC) for graduates and all students at Montgomery College.

The cost to the State of Maryland was included for two primary reasons. First of all, a significant percentage of Maryland tax dollar support of Montgomery College came from Montgomery County taxpayers. Secondly, most of the students will remain in the State if not in Montgomery County itself. Follow-up studies have shown that high percentages of students (over 90 percent) remain in Maryland or Washington, D.C. Maryland community colleges also receive their main support from the State, the counties and the students themselves; only a small proportion comes from outside sources. Society in this study, therefore, is defined as the people of Maryland.

Other direct costs, such as books, supplies and transportation were the same as those used in the private equations (Tables 6 and 7).

TABLE 6
Social Cost Factors - All Students

Student Status	Age	Foregone Earnings: Employed Full-Time	Foregone Earnings: Employed Part-Time	Foregone Earnings: Unemployed	Years In College	Fin. Aid	Credit Hours	Cost Per Hour	Credit Hour Cost	Books & Supplies	Trans-portation
Male											
Full-time	20	0	$3,640	$7,500	1	$132	26	$89.04	$2,315	$286	$1,020
Part-time	25				2						
Yr 1		0	$3,640	$7,500		$132	13	$89.04	$1,157	$143	$ 510
Yr 2		0	$3,713	$7,650		$132	13	$93.83	$1,220	$143	$ 510
Female											
Full-time	19	0	$3,640	$7,500	1	$132	23	$89.04	$2,048	$257	$1,020
Part-time	29				2						
Yr 1		0	$3,640	$7,500		$132	11	$89.04	$ 979	$128	$ 510
Yr 2		0	$3,713	$7,650		$132	12	$93.83	$1,126	$129	$ 510

TABLE 7
Social Cost Factors - Graduates

Student Status	Age	Foregone Earnings: Employed Full-Time	Foregone Earnings: Employed Part-Time	Foregone Earnings: Unemployed	Years In College	Fin. Aid	Credit Hours	Per Hour	Hour Cost	Books & Supplies	Trans-portation
Full-time	21				2						
Yr 1		0	$3,640	$7,500		$132	31	$89.04	$2,760	$330	$1,020
Yr 2		0	$3,713	$7,650		$132	32	$93.83	$3,003	$330	$1,020
Part-time	19				4						
Yr 1		0	$3,640	$7,500		$132	15	$75.33	$1,130	$165	$ 510
Yr 2		0	$3,713	$7,650		$132	16	$87.09	$1,393	$165	$ 510
Yr 3		0	$3,787	$7,802		$132	16	$89.04	$1,425	$165	$ 510
Yr 4		0	$3,863	$7,959		$132	16	$93.83	$1,501	$165	$ 510

Opportunity costs included the foregone earnings of students which serve as an indicator of lost productivity and tax revenue to the County and State. An opportunity cost that was not included was foregone real estate taxes on property owned by the College. Although this amount was estimated in an earlier study, the cost per student proved to be insignificant. (See the section on foregone earnings under Private Investment for an explanation of how foregone earnings were derived.)

2. Community College Benefits

The primary benefit to society from its investment in higher education is the increased productivity resulting from the increased learning. This was measured by differences in earnings among those with different educational backgrounds. The same factors which affected the earning differentials in the private calculations, including ability and employment rates, also affected the social computations.

The other benefit that came to Montgomery College students from outside the State was federal student financial aid. The average award per student (not including loans) was included in the equations. (See Tables 6 and 7)

There are other benefits to society that were not captured by simply focusing on earning differentials. For example, higher education appears to increase a persons' sense of citizenship and community responsibility. Another important benefit is the reduced transfer payments, such as welfare and unemployment compensation, which go heavily to the less educated. (For a more complete discussion of benefits and earning differentials, refer to the benefit section under Private Investment.)

3. Results

The same factors which affected the private rate of return, such as student employment, labor force participation and low cost, also affected the social rate of return. For this reason, the population for graduates and all students were divided into similar subgroups.

The internal rate of return to society for the investment in education at Montgomery College for all students ranged from a high of 48 percent for full-time employed males attending College full-time to a low of eight percent for unemployed females enrolled part-time (Table 8).

Society could expect a return for the average student at Montgomery College of about 18 percent. The average student figure was calculated by weighting the subgroup averages by the percentages found in Table 4.

TABLE 8

Human Capital Internal Rates Of Return For Social Investment

All Students

	Internal Rate Of Return
Average student	17.8%
Male	
Part-time student	
Employed full-time	18.3%
Employed part-time	11.4%
Unemployed	8.1%
Full-time student	
Employed full-time	48.0%
Employed part-time	18.5%
Unemployed	12.7%
Female	
Part-time student	
Employed full-time	24.5%
Employed part-time	12.5%
Unemployed	8.0%
Full-time student	
Employed full-time	14.8%
Employed part-time	10.7%
Unemployed	8.3%

The social return on an investment in a Montgomery College graduate was about 25 percent (Table 9). By subgroup, the social returns ranged from a high of 40.6 percent for full-time employed males who attended college full-time to a low of 11.5 percent for unemployed females attending college part-time.

TABLE 9
Human Capital Internal Rates Of Return For Social Investment
All Students

	Internal Rate Of Return
Average student	24.5%
Male	
Part-time student	
Employed full-time	33.5%
Employed part-time	17.5%
Unemployed	12.2%
Full-time student	
Employed full-time	40.6%
Employed part-time	26.1%
Unemployed	19.4%
Female	
Part-time student	
Employed full-time	27.2%
Employed part-time	15.9%
Unemployed	11.5%
Full-time student	
Employed full-time	31.6%
Employed part-time	22.4%
Unemployed	17.4%

DISCUSSION

One of the problems in conducting a human capital study is first determining what data elements should be included and secondly finding reliable values for each variable. Throughout the explanations given in the results section, estimates were used and caveats given. In most instances, conservative estimates were used, even when their use caused obvious understatement of returns. At the same time, enough studies in the area of human capital have been done to prove the validity of the methodology. While the resulting percentages may not reflect exact returns, they do provide a sound estimate of the economic value of education at Montgomery College.

Keeping all the limitations of this study in mind, the results still indicated a solid return both to individuals and to society for their investment in community college education. These results followed trends found in a study of 1972 high school graduates by the National Center for Education Statistics[12] and studies of lifetime earnings by the U.S. Bureau of the Census.[13]

The results also indicated returns for graduates, both for individuals and society, were usually greater than those for students who did not graduate. This could be important for students making crucial educational decisions.

Finally, the estimates in this study fall far short of an accurate determination of all the social and private benefits that come from investing in community college education. The computed returns imply, however, that for now investment in education at Montgomery College is sound economic policy.

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GLOSSARY

1. Human capital investment: long-term (hence capital) investment in a person's cognitive, physical, social and psychological skills with which he/she earns a living. Higher education is an example of a human capital investment.

2. Internal rate of return: a method used to quantify the impact of a human capital investment. In higher education, costs (such as tuition and fees) are contrasted to benefits (the difference between future lifetime earnings of those with less education and those with greater education) to compute an interest rate than can be compared to other long-tern or capital investments.

3. Productivity: a measure of output, such as the Gross National Product (GNP). Productivity can be increased by technology or increased worker efficiency. Human capital studies often use workers' earnings to measure productivity in society.

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